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An Observational Study to Evaluate Risk Factors and Prevalence Associated with Peripheral Arterial Disease in Type 2 Diabetes Mellitus with Coronary Artery Disease

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ABSTRACT

Aim & Objective: One of the major microvascular complications that are associated with diabetes is peripheral artery disease which also known as arteriosclerosis obliterans. There are several research papers which already confirm the effect of PAD on vascular complications in patients with type 2 diabetes (T2DM). The main objective of this study is to evaluate risk factors and prevalence associated with peripheral arterial disease in type 2 diabetes mellitus with coronary artery disease.
Materials & Methods: 150 randomly selected patients were interviewed with a predesigned questionnaire in addition to a detailed physical examination and case history. CAD in patients was diagnosed by any past history of CAD, medication taken for CAD, ECG changes or any history of angina. Ankle brachial index (ABI) screening was done through Hand held Doppler. Data was collected in Microsoft Excel and analysed.
Results: 150 patients were randomly selected from patients who are attending the daily clinics. Demographic details of the participants were listed in table 1. Among participants 90 (60%) patients were male and rest 60 (40%) patients were female. Mean age of participants were 61.08 ± 8.1 years were as this were almost same for both men and women. 78% of participant had family history of diabetes along with 78% patients had family history of hypertension. 56.6% male patients were obese whereas 68% of female patients belong to obese category. CAD as assessed by history of angina, ECG changes, any past history of CAD or any treatment taken for CAD was present in 60% (men: 54.4% and women: 68.3%). Prevalence of cardiovascular risk factors in the study group were listed in table 2. 22.6% patients were smoker while 61.3% patients having BMI>25kg/m^2.
Conclusion: PAD was found to be significantly correlated with uncontrolled diabetes and associated CAD. Thus all patients who have high risk factors of cardiovascular disease and metabolic disease should screened with ABI to diagnosed Pad. PAD can alert physic for diabetes patient to prevent underlying CAD.

Keywords: Peripheral arterial disease (PAD), diabetes, Coronary artery disease (CAD), Ankle-brachial index (ABI).

INTRODUCTION

Peripheral vascular disease should include all vessels in our body i.e. both arteries and veins. Peripheral arterial disease is a nearly pandemic condition that may lead to loss of limb or even life. It usually embraces a wide spectrum of disease with equally widely variable manifestation. Prevalence of peripheral arterial disease varies between studies. When ankle brachial index and noninvasive measurements was used the prevalence increased by 3 times as compared to studies based on questionnaires, The prevalence rate based on definition of PAD as ABI<0.90, is around 29% in primary care practices [1,2].

PVD, also known as arteriosclerosis obliterates, is primarily the result of atherosclerosis. The atheroma consists of a core of cholesterol joined to proteins with a fibrous intravascular covering. The atherosclerotic process gradually may progress to complete occlusion of medium and large arteries. The disease typically is segmental with significant variation from patient to patient. The pathophysiology of arterial occlusive disease is related to the arterial blood supply versus demand of muscles or organs. In both chronic and acute occlusive disease, the degree of schema is related to, the size and proximity of the occluded artery to the muscle or end organ, the presence of collateral circulation, the rapidly of the occlusion and the patient's blood pressure.

The main objective of this study is to evaluate risk factors and prevalence associated with peripheral arterial disease in type 2 diabetes mellitus with coronary artery disease.

MATERIALS & METHODS

150 randomly selected patients were interviewed with a predesigned questionnaire in addition to a detailed physical examination and case history. CAD in patients was diagnosed by any past history of CAD, medication taken for CAD, ECG changes or any history of angina. Ankle brachial index (ABI) screening was done through Hand held Doppler. Data was collected in Microsoft Excel and analysed.

PVD may be classified into 4 stages according to Leriche and Fontaine classification.

Stage I = Asymptomatic
Stage IIa = Walking distance is more than 200 meters.
Stage IIb = Walking distance less than 200 meters.
Stage III = Rest pain particularly at night.
Stage IV = Ulcerations ranging from trophic lesions to gangrene.

Stage III and stage IV are considered as critical leg ischemia when ankle pressure is bellow 50-70mmHg, toe pressure below 30-50 mmHg and transcutaneous partial pressure of oxygen (TcPO2) is diminished to 30-50 mmHg.

ABI was calculated using hand held doppler probe and blood pressure was measured in all four limbs at brachial and posterior tibial artery/dorsalis pedis artery. ABI was calculated as ankle pressure/ brachial pressure and the lower ratio amongst the two was chosen. ABI<0.9 was diagnosed as PAD

Data was coded and entered in SPSS version 20 for analysis. The baseline characteristics were summarized and presented as means/medians and proportions. Associations were tested using chi square test for categorical variables (proportions) and student t-test for continuous variables (means). Associations between different parameters were tested.

RESULT

150 patients were randomly selected from patients who are attending the daily clinics. Demographic details of the participants were listed in table 1. Among participants 90 (60%) patients were male and rest 60 (40%) patients were female.

Table 1: Demographic and clinical profile of patients in the study group.

Parameters	Men (n=90)	Women (n=60)	Total (n=150)
Age (Years)	61.12 ± 8.5	61.02 ± 7.8	61.08 ± 8.1
Duration of Diabetes (Years)	9.52 ± 3.19	10.31 ± 4.37	10.1 ± 3.77
Family history of Hypertension (n%)	63 (70%)	45 (75%)	108 (72%)
Family history of Diabetes (n%)	68 (75.5%)	49(81.6%)	117 (78%)
History of Obesity (n%)	51 (56.6%)	41 (68%)	92 (61.3%)
CAD (n%)	49 (54.4%)	41 (68.3%)	90 (60%)

Mean age of participants were 61.08 ± 8.1 years were as this were almost same for both men and women. 78% of participant had family history of diabetes along with 78% patients had family history of hypertension. 56.6% male patients were

obese whereas 68% of female patients belong to obese category. CAD as assessed by history of angina, ECG changes, any past history of CAD or any treatment taken for CAD was present in 60% (men: 54.4% and women: 68.3%) (table 1).

Prevalence of cardiovascular risk factors in the study group were listed in table 2. 22.6% patients were smoker while 61.3% patients having BMI>25kg/m^2 (Table 2).

Participants were having high risk factor of CAD. Difference between Pad and non-PAD were listed in table 3. PAD was found to be significantly correlated with age, duration of diabetes, smoking, systolic blood pressure, diastolic blood pressure, prevalence of BMI >25 kg/m^2, HbA1c and serum HDL ≤40 mg%.

Table 2: Prevalence of cardiovascular risk factors in the study group

Risk Factor	N (%)
Smoking	34 (22.6%)
BMI>25kg/m^2	92 (61.3%)
Hypertension	108 (72%)
HbA1c>7%	78 (52%)
Serum total cholesterol ≥200 mg/dl	60 (40%)
Serum triglycerides ≥150 mg/dl	40 (26.6%)
Serum LDL cholesterol≥100mg/dl	63 (42%)
Serum HDL cholesterol≤40 mg/dl	94 (62.6%)
Albuminuria >30mg/24 hours	50 (33.3%)

Table 3: Cardiovascular disease risk factors in PAD and Non-PAD groups

Characteristics	Non PAD	PAD	P Value
Age (Years)	56 ± 3.2	67.43 ± 2.8	0.101
BMI (kg/m^2)	26.71 ± 4.84	28.93 ± 4.43	0.561
Duration of Diabetes (Years)	8.1 ± 2.77	12.2 ± 2.62	0.104
History of Hypertension (Years)	20 (18.5%)	88 (81.5%)	0.173
Smoking	12 (35.3%)	22 (64.7%)	0.032
CAD	12 (13.3%)	78 (86.6%)	0.047
SBP (mmHg)	132.52 ± 8.46	144.63 ± 9.84	0.001
DBP (mmHg)	85.57 ± 5.37	90.66 ± 6.23	0.005
HbA1c	7.1 ± 0.8	8.6 ± 0.4	0.005
Fasting blood glucose (mg/dl)	145.47 ± 29.25	149.85 ± 31.19	0.005
Post-prandial blood glucose (mg/dl)	198.88 ± 58.36	254.93 ± 62.31	0.005
Serum total cholesterol (mg/dl)	191.42 ± 39.31	201.89 ± 41.16	0.127
Serum triglycerides (mg/dl)	148.21 ± 61.23	151.19 ± 59.74	0.743
Serum LDL cholesterol (mg/dl)	103.24 ± 32.16	109.38 ± 38.42	0.952
Serum HDL cholesterol (mg/dl)	44.03 ± 8.85	39.11 ± 6.39	0.231
Albuminuria (mg/24 hours)	57.61 ± 245.23	75.01 ± 193.52	0.783

DISCUSSION

The two most important risk factors associated with PAD are smoking and diabetes mellitus. One study of intermittent claudication reported that 16% of smokers progressed to ischemic rest pain, compared with 0% of those who had quit smoking [8]. Among diabetic PAD patients, gangrene develops in 31%, compared with only 5% of nondiabetic PAD patients. Rest pain occurs in 40% and 18%, respectively [9]. Finally, patients with PAD and diabetes are reported to have 5 year mortality rates of up to 50% [10]. In our study, 64.7% patients were having history of smoking, whereas 35.5% patients who were non PAD having history of non-PAD.

Dyslipidemia are common in patients with PAD. Several trials have demonstrated significant reductions in death and myocardial infraction in patients treated with HMG-Ca A reductive inhibitors. The underlying mechanism for the reduction of cardiovascular events is the ability of the HMG-CoA reductase inhibitors to stabilise a fragile atherosclerosis coronary plaque and thereby reduce the likelihood of plaque rapture and thrombosis. In its guidelines, the National Cholesterol Education Programme recommends that patients with PAD target their low-density lipoprotein level to less than 100 mg/dl [11]. In this trial it has been observed that, 40% patients having serum total cholesterol ≥200 mg/dl, 26.6% patients having serum triglycerides ≥150 mg/dl, 42% patients having serum LDL cholesterol ≥100mg/dl and 62.6% patients having serum HDL cholesterol≤40 mg/dl.

High BP not only increases the risk of claudication in patients with PAD, it

increases the risk of cardiovascular morbidity and mortality as well. Ideally, systolic BP should be kept lower than 130 mmHg and diastolic BP less than 85 mmHg. Keep in mind, however, that lowering BP too much can also lower limb perfusion pressure and worsen claudication symptoms [12].

DM is a major risk factor for atherosclerotic disease as well as cardiovascular mortality and morbidity [13,14]. Atherosclerotic disease is not only increased in incidence in diabetic patients, but its course is also accelerated [15], thereby accounting for as much as 44% of all-cause mortality [16]. DM-associated atherosclerosis can lead to complications in all major of vascular beds, including the coronary arteries, carotid vessels, and lower extremity arteries [17,18]. For example, a study by Haffner et al [19], estimated the 7-year incidence of a first-time myocardial infarction (MI) in diabetic patients at 20.2%, compared to 3.5% in nondiabetic patients.

CONCLUSION

PAD was found to be significantly correlated with uncontrolled diabetes and associated CAD. Thus all patients who have high risk factors of cardiovascular disease and metabolic disease should screened with ABI to diagnosed Pad. PAD can alert physic for diabetes patient to prevent underlying CAD.

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